

REMARKS

Applicants thank the Examiner for the curtsies extended to Applicants' representative during an interview in connection with the present application on July 22, 2004. Claims 1-6 and 9-12 are currently being prosecuted. The Examiner is respectfully requested to reconsider his rejections in view of the Amendments and Remarks as set forth hereinbelow.

FINALITY OF THE LAST OFFICE ACTION

It is respectfully requested that the Examiner reconsider the finality of the last office action. Claim 1 was only amended in the last amendment to substantially include the subject matter of original claims 3 and 4. Claims 9 and 10 were amended to depend from claim 6. The Examiner relied on the newly cited Masao Ishihama et al publication dated October, 1991 in formulating a rejection of claims 1 and 6. Applicants' amendment to claim 1 did not necessitate the new grounds of rejection. The Examiner is respectfully requested to withdraw the finality of the last office action.

REASONS FOR ENTRY OF AMENDMENT

It is respectfully submitted that the amendments to the claims automatically place the present application in condition for allowance.

If the Examiner does not agree that the application is in condition for allowance and if the Examiner does not agree to withdraw the finality of the last office action, it is respectfully requested

that the present amendment should be entered since the amendment places the application in better form for appeal. The present amendment reduces the issues on appeal by clarifying the subject matter as set forth in claims 1 and 6. The present amendment was not presented at an earlier date in view of the fact that the applicant did know of the rejection based on the Masao Ishihama et al publication and did not fully understand the Examiner's new grounds of rejection until he had an opportunity to review the Examiner's last office action. It is requested that the present amendment be entered into the present application.

REJECTION UNDER 35 USC 103(b)

Claims 1-5 stand rejected under 35 U.S.C. § 103(a) as being unpatentable over Nakao et al., U.S. Patent No. 5,651,072 in view of the Masao Ishihama et al publication. This rejection is respectfully traversed.

As the Examiner will note, claim 1 has been amended to include a combination of elements wherein the microphone is disposed centrally in the width direction of the vehicle and at an antinode of an acoustic normal mode of the passenger compartment for detecting and canceling the noise of which sound pressure level is high and for generating an output signal as the reference signal. It is respectfully submitted that the claims 1-5 define patentably over the Nakao et al. patent and the Masao Ishihama et al publication for the following reasons.

As acknowledged by the Examiner on page 3 the second full paragraph of his rejection, “Nakao does not clearly teach a microphone disposed centrally in the width direction of the vehicle and at an antinode of an acoustic normal mode of the passenger compartment, for generating an output signal as the reference signal.”

The Examiner relied on the Masao Ishihama et al publication for apparently teaching the use of four microphones that are positioned in the roof of a vehicle. The Examiner incorrectly concluded that the four microphones are “disposed centrally in the width direction of the vehicle (see fig. 11, 4, microphones) and at an antinode of an acoustic normal mode of the passenger compartment.” The Examiner's analysis is not correct.

FIG. 11 of the Masao Ishihama et al publication is a side view simply showing that microphones are provided under a roof in a passenger compartment of a vehicle. The Masao Ishihama et al publication discloses no microphone which is disposed centrally in the width direction of the vehicle and at an antinode of an acoustic normal mode of the passenger compartment. The four microphones shown in FIG. 11 are used for detecting interference between engine noise and noise cancellation sounds outputted from two speakers. Namely, the four microphones of the Masao Ishihama et al publication corresponds to the microphone for confirming cancellation of the noise according to the present invention. Presumably, the four microphones of the Masao Ishihama et al publication are provided above four passenger seats, respectively. It is not believed that the four microphones are arranged centrally in the width direction of the vehicle.

The Masao Ishihama et al publication does not suggest any positional arrangement of the microphone for producing the reference signal. The disclosure set forth on page 36 of the Masao Ishihama et al publication indicates that cancellation sound generating means provided in the antinode of the cavity resonant mode is used for eliminating potential energy corresponding to the mode. On page 36, there is no suggestion about the position of the microphone for producing the reference signal.

In contradistinction thereto claim 1 of the present invention sets forth a combination of elements wherein the microphone is disposed centrally in the width direction of the vehicle and at an antinode of an acoustic normal mode of the passenger compartment for detecting and canceling the noise of which sound pressure level is high and for generating an output signal as the reference signal. As illustrated in Fig. 18 and as discussed on page 29, line 10 and continuing to page 31, line 3 of the present application, it is intended that high sound pressure levels of noise are detected. The output signals of the microphone is used as a reference signals (error signals). Accordingly, the active noise control system can attenuate noise in the passenger compartment at the ears on the compartment side of the occupants where the sound pressure of the noise is relatively high.

The microphone is disposed centrally in the width direction of the vehicle for positioning the microphone the farthest from the side windows of the vehicle. Thus, the influence of external noises, the sound pressure level detected by the microphone, from the side windows such as wind roars will be as small as possible. As a result, the noise whose

sound level is high in the passenger compartment can be detected to a relatively large extent. Based on the detected signals of the microphone, the noises whose sound level is high in the passenger compartment can be attenuated or reduced effectively.

In addition, the claims 11 and 12 have been added which are directed to a combination of elements wherein the frequency of the noise ranges from 20 to 120 Hz and upward. Support for claims 11 and 12 is located on page 1, lines 14-16 of the specification and Fig. 18. The upper limit of 120 Hz has been chosen based on Fig. 18 and in view of the disclosure on Page 35 of the Masao Ishihama et al publication which specifically addresses a booming noise of about 250 Hz. In addition, the graph illustrated on page 33 of the Masao Ishihama et al publication sets forth the high ranges for the noise. It is respectfully submitted that the claims 11 and 12 clearly define patentable over the combination of references relied on in the Examiner's rejection.

Claims 6 and 9-10 stand rejected under 35 U.S.C. 103(a) as being unpatentable over Masao Ishihama et al publication in view of Mason et al., U.S. Patent No. 5,410,607. This rejection is respectfully traversed.

According to the present invention recited in claim 6, a combination of elements are set forth wherein the microphone and the feedback control circuit are housed together in the same storage box. The feedback control circuit has an adjusting circuit for adjusting the amplitude and phase between a canceling sound generating means and the microphone, based on a transfer characteristic from the microphone. Therefore, the speaker (cancellation

sound generating means) can be provided separately from the storage box. The small microphone and the feedback circuit can be placed in the storage box and the large speaker is placed separately from the box. Since the storage box containing only the small microphone and the circuit can be placed in a small space, e.g., under a seat, the limited space in the vehicle can be utilized efficiently. Further, conventional audio speakers can be used as the cancellation sound generating means. The adjusting circuit operated based on transfer characteristic between the microphone and the speaker allows the microphone and the speaker to be placed separately. In addition, claim 6 sets forth a combination of elements wherein the microphone is positioned centrally in the width direction of the vehicle and at an antinode of a primary or secondary acoustic normal mode of the passenger compartment of the vehicle for detecting and canceling the noise of which sound pressure level is high.

As acknowledged by the Examiner on page 5 the first full paragraph of his rejection, "Masao does not clearly teach a storage box, wherein said microphone and said feedback control circuit are housed together in said storage box...."

The Masao Ishihama et al publication discloses two speakers placed under a seat. As acknowledged by the Examiner, a storage box is not disclosed.

According to the disclosure of Mason, a sensor (microphone) and a circuit and a speaker are placed in the same storage box. The speaker is not separately provided from the storage box. Therefore, it may be difficult to provide the storage box in the limited space in

the vehicle. In the system of Mason, if the storage box is not placed in a suitable position in the vehicle, the noise cancellation sound cannot be outputted effectively.

In contrast, according to the distinctive feature of the present invention recited in claim 6, a combination of elements are set forth wherein the speaker can be provided separately from the microphone. In addition, the microphone of the present invention is positioned centrally in the width direction of the vehicle and at an antinode of a primary and secondary acoustic normal mode of the passenger compartment of the vehicle for detecting and canceling the noise of which sound pressure level is high. Neither the Masao Ishihama et al publication nor Mason discloses any concept for allowing the speaker to be provided separately from the microphone or for addressing the noise of which the sound pressure level is high.

Again, according to the present invention, since the microphone and control circuit are commonly disposed in the storage box, with the canceling sound generating means being disposed separately therefrom, the storage box can be installed in a limited space, for example, as set forth in claim 9 beneath the seat. In other words, the canceling sound generating means, which does not need to be placed at the noise antinode may be made separate, whereas the microphone which may be placed at the noise antinode, is installed in an installation space at the noise antinode, permitting its use in a limited space. In addition, by installing the canceling sound generating means separately, it is also possible to use a

conventional audio speaker. In this case, the adjusting circuit functions based on a transfer characteristic between the canceling noise generating means and the microphone.

Accordingly, the structure and effects of the claimed invention according to claim 6, 9, 10 and 12 which is directed to a combination of elements wherein the canceling sound generating means is disposed separately from the storage box, is not shown or suggested by the cited references, whether considered separately or in combination.

NO PROSECUTION HISTORY ESTOPPEL

Claims 1 and 6 have been amended to clarify the claimed subject matter. No prosecution history estoppel would apply to the interpretation of the limitations set forth in claims 1-6, 9-12 in view of the fact that this subject matter has been continuously presented since the original filing date of the present application.

CONCLUSION

In view of the above remarks, it is believed that the claims clearly distinguish over the patents relied on by the Examiner, either alone or in combination.

Since the remaining patents cited by the Examiner have not been utilized to reject the claims, but to merely show the state of the art, no comment need be made with respect thereto.

In view of the above amendments and remarks, reconsideration of the rejections and allowance of all of the claims are respectfully requested.

All of the stated grounds of rejection have been properly traversed, accommodated, or rendered moot. Applicants therefore respectfully request that the Examiner reconsider all presently outstanding rejections and that they be withdrawn. It is believed that a full and complete response has been made to the outstanding Office Action, and as such, the present application is in condition for allowance.

If the Examiner believes, for any reason, that personal communication will expedite prosecution of this application, the Examiner is invited to telephone the undersigned at (703) 205-8000 in the Washington, D.C. area.

Pursuant to the provisions of 37 CFR 1.17 and 1.136(a), Applicant respectfully petitions for a two (2) month extension of time for filing a response in connection with the present application. The required fee of \$420.00 is attached hereto.

A prompt and favorable consideration of this Amendment is respectfully requested.

Application No.: 09/522,178
Amdt. dated August 30, 2004
Reply to Office Action of March 30, 2004

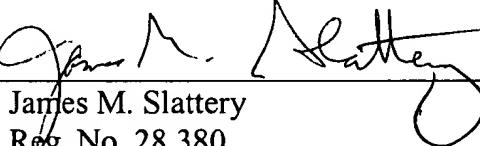
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If necessary, the Commissioner is hereby authorized in this, concurrent, and future replies to charge payment or credit any overpayment to Deposit Account No. 02-2448 for any additional fees required under 37 C.F.R. §§ 1.16 or 1.17; particularly, extension of time fees.

Respectfully submitted,

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